DEPARTMENT OF ENERGY

[Case No. 2021-009; EERE-2021-BT-WAV-0025]

Energy Conservation Program: Notification of Petition for Waiver of Nortek Global HVAC, LLC from the Department of Energy Central Air Conditioners and Heat Pumps Test Procedure, Notification of Denial of Interim Waiver, and Request for Comment

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

ACTION: Notification of petition for waiver and denial of an interim waiver; request for comments.

SUMMARY: This notification announces receipt of and publishes a petition for waiver and interim waiver from Nortek Global HVAC, LLC ("Nortek"), which seeks a waiver for specified central air conditioner and heat pump basic models from the U.S. Department of Energy ("DOE") test procedure used for determining the energy efficiency of these products. This notification also announces that DOE is declining to grant the request for an interim waiver from the test procedure for the reasons described in this notification. DOE solicits comments, data, and information concerning the petition and its suggested alternate test procedure so as to inform DOE's final decision on the waiver request.

DATES: Written comments and information are requested and will be accepted on or before **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**.

ADDRESSES: Interested persons are encouraged to submit comments using the Federal eRulemaking Portal at *www.regulations.gov*. Alternatively, interested persons may submit comments, identified by case number 2021-009 and Docket number EERE-2021-BT-WAV-0025, by any of the following methods:

1. *Federal eRulemaking Portal: www.regulations.gov*. Follow the instructions for submitting comments.

2. *E-mail*: *AS_Waiver_Requests@ee.doe.gov*. Include the docket number EERE-2021-BT-WAV-0025 in the subject line of the message.

No telefacsimiles ("faxes") will be accepted. For detailed instructions on submitting comments and additional information on this process, see the "**SUPPLEMENTARY INFORMATION**" section of this document.

Although DOE has routinely accepted public comment submissions through a variety of mechanisms, including postal mail and hand delivery/courier, the Department has found it necessary to make temporary modifications to the comment submission process in light of the ongoing coronavirus ("COVID-19") pandemic. DOE is currently suspending receipt of public comments via postal mail and hand delivery/courier. If a commenter finds that this change poses an undue hardship, please contact Appliance Standards Program staff at (202) 586-1445 to discuss the need for alternative arrangements. Once the COVID-19 pandemic health emergency is resolved, DOE anticipates resuming all of its regular options for public comment submission, including postal mail and hand delivery/courier.

Docket: The docket, which includes *Federal Register* notices, comments, and other supporting documents/materials, is available for review at *www.regulations.gov*. All documents in the docket are listed in the *www.regulations.gov* index. However, some documents listed in the index, such as those containing information that is exempt from public disclosure, may not be publicly available.

The docket web page can be found at *www.regulations.gov/docket?D=EERE-2021-BT-WAV-0025*. The docket web page contains instruction on how to access all documents, including public comments, in the docket. See the "**SUPPLEMENTARY INFORMATION**" section for information how to submit comments through *www.regulations.gov*.

FOR FURTHER INFORMATION CONTACT: Ms. Julia Hegarty, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, Mailstop EE-5B, 1000 Independence Avenue, SW., Washington, DC 20585-0121. E-mail: *S_Waiver_Requests@ee.doe.gov*.

Mr. Peter Cochran, U.S. Department of Energy, Office of the General Counsel, Mail Stop GC-33, Forrestal Building, 1000 Independence Avenue, SW., Washington, DC 20585-0103. Telephone: (202) 586-9496. E-mail: *peter.cochran@hq.doe.gov*.

SUPPLEMENTARY INFORMATION: DOE is publishing Nortek's petition for waiver, pursuant to 10 CFR 430.27(b)(1)(iv), inclusive of all substantive portions thereof and absent any information for which petitioner requested treatment as confidential business information.[1] DOE invites all interested parties to submit in writing by [**INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER***], comments and information on all aspects of the petition, including an alternate test procedure. Pursuant to 10 CFR 430.27(d), any person submitting written comments to DOE must also send a copy of such comments to the petitioner. The contact information for the petitioner is:

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[1]The petition as submitted included the entire text of 10 CFR part 430 subpart B appendix M1. The reprint of the petition at the end of this notification includes only the substantive provisions of that appendix. The petition for waiver and petition for interim waiver is available in its entirety at *www.regulations.gov/docket?D=EERE-2021-BT-WAV-0025* .

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Submitting comments via www.regulations.gov. The *www.regulations.gov* web page will require you to provide your name and contact information. Your contact information will be viewable to DOE Building Technologies staff only. Your contact information will not be publicly viewable except for your first and last names, organization name (if any), and submitter representative name (if any). If your comment is not processed properly because of technical difficulties, DOE will use this information to contact you. If DOE cannot read your comment due to technical difficulties and cannot contact you for clarification, DOE may not be able to consider your comment.

However, your contact information will be publicly viewable if you include it in the comment or in any documents attached to your comment. Any information that you do not want to be publicly viewable should not be included in your comment, nor in any document attached to your comment. If this instruction is followed, persons viewing comments will see only first and last names, organization names, correspondence containing comments, and any documents submitted with the comments.

Do not submit to *www.regulations.gov* information for which disclosure is restricted by statute, such as trade secrets and commercial or financial information (hereinafter referred to as Confidential Business Information ("CBI")). Comments submitted through *www.regulations.gov* cannot be claimed as CBI. Comments received through the website will waive any CBI claims for the information submitted. For information on submitting CBI, see the Confidential Business Information section.

DOE processes submissions made through *www.regulations.gov* before posting. Normally, comments will be posted within a few days of being submitted. However, if large volumes of comments are being processed simultaneously, your comment may not be viewable for up to several weeks. Please keep the comment tracking number that *www.regulations.gov* provides after you have successfully uploaded your comment.

Submitting comments via email. Comments and documents submitted via email also will be posted to *www.regulations.gov*. If you do not want your personal contact information to be publicly viewable, do not include it in your comment or any accompanying documents. Instead, provide your contact information on a cover letter. Include your first and last names, email address, telephone number, and optional mailing address. The cover letter will not be publicly viewable if it does not include any comments.

Include contact information each time you submit comments, data, documents, and other information to DOE. Faxes will not be accepted.

Comments, data, and other information submitted to DOE electronically should be provided in PDF (preferred), Microsoft Word or Excel, WordPerfect, or text (ASCII) file format. Provide documents that are not secured, written in English and free of any defects or viruses. Documents should not contain special characters or any form of encryption and, if possible, they should carry the electronic signature of the author.

Campaign form letters. Please submit campaign form letters by the originating organization in batches of between 50 to 500 form letters per PDF or as one form letter with a list of supporters' names compiled into one or more PDFs. This reduces comment processing and posting time.

Confidential Business Information. According to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email two well-marked copies: one copy of the document marked confidential including all the information believed to be confidential, and one copy of the document marked "non-confidential" with the information believed to be confidential deleted. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

It is DOE's policy that all comments may be included in the public docket, without change and as received, including any personal information provided in the comments (except information deemed to be exempt from public disclosure).

I. Background and Authority

The Energy Policy and Conservation Act, as amended ("EPCA"),[2] authorizes DOE to regulate the energy efficiency of a number of consumer products and industrial equipment. (42 U.S.C. 6291-6317) Title III, Part B[3] of EPCA, Pub. L. 94-163 (42 U.S.C. 6291-6309, as codified), established the Energy Conservation Program for Consumer Products Other Than Automobiles, which sets forth a variety of provisions designed to improve energy efficiency for certain types of consumer products. These products include central air conditioners and heat pumps ("CAC/HPs"), the subject of this notification. (42 U.S.C. 6292(a)(3))

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[2] All references to EPCA in this document refer to the statute as amended through the Energy Act of 2020, Pub. L. 116-260 (Dec. 27, 2021).
[3] For editorial reasons, upon codification in the U.S. Code, Part B was redesignated as Part A.

The energy conservation program under EPCA consists essentially of four parts: (1) testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. Relevant provisions of EPCA include definitions (42 U.S.C. 6291), test procedures (42 U.S.C. 6293), labeling provisions (42 U.S.C. 6294), energy conservation standards (42 U.S.C. 6295), and the authority to require information and reports from manufacturers (42 U.S.C. 6296).

The Federal testing requirements consist of test procedures that manufacturers of covered products must use as the basis for: (1) certifying to DOE that their products comply with the applicable energy conservation standards adopted pursuant to EPCA (42 U.S.C. 6295(s)), and (2) making representations about the efficiency of that product (42 U.S.C. 6293(c)). Similarly, DOE must use these test procedures to determine whether the product complies with relevant standards promulgated under EPCA. (42 U.S.C. 6295(s))

Under 42 U.S.C. 6293, EPCA sets forth the criteria and procedures DOE is required to follow when prescribing or amending test procedures for covered products. EPCA requires that any test procedures prescribed or amended under this section must be reasonably designed to produce test results which reflect energy efficiency, energy use or estimated annual operating cost of a covered product during a representative average use cycle or period of use and requires that test procedures not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3))

Beginning January 1, 2023, any representations, including compliance certifications, made with respect to the energy use, power, or efficiency of CAC/HPs must be based on the results of testing according to the test procedure contained in the Code of Federal Regulations ("CFR") at 10 CFR part 430, subpart B, appendix M1, *Uniform Test Method for Measuring the Energy Consumption of Central Air Conditioners and Heat Pumps* ("Appendix M1").

Under 10 CFR 430.27, any interested person may submit a petition for waiver from DOE's test procedure requirements. DOE will grant a waiver from the test procedure requirements if DOE determines either that the basic model for which the waiver was requested contains a design characteristic that prevents testing of the basic model according to the prescribed test procedures, or that the prescribed test procedures evaluate the basic model in a manner so unrepresentative of its true energy consumption characteristics as to provide materially inaccurate comparative data. 10 CFR 430.27(f)(2). A petitioner must include in its petition any alternate test procedures known to the petitioner to evaluate the performance of the product type in a manner representative of the energy consumption characteristics of the basic model. 10 CFR 430.27(b)(1)(iii). DOE may grant the waiver subject the conditions, including adherence to alternate test procedures. 10 CFR 430.27(f)(2).

As soon as practicable after the granting of any waiver, DOE will publish in the *Federal Register* a notice of proposed rulemaking to amend its regulations so as to eliminate any need for the continuation of such waiver. 10 CFR 430.27(l) As soon thereafter as practicable, DOE will publish in the *Federal Register* a final rule to that effect. *Id*.

The waiver process also provides that DOE may grant an interim waiver if it appears likely that the underlying petition for waiver will be granted and/or if DOE determines that it would be desirable for public policy reasons to grant immediate relief pending a determination on the underlying petition for waiver. 10 CFR 430.27(e)(2). Within one year of issuance of an interim waiver, DOE will either: (i) publish in the *Federal Register* a determination on the petition for waiver; or (ii) publish in the *Federal Register* a new or amended test procedure that addresses the issues presented in the waiver. 10 CFR 430.27(h)(2).

If DOE ultimately denies the petition for waiver, or if the alternate test procedure specified in the interim waiver differs from the alternate test procedure specified by DOE in a subsequent Decision and Order, DOE will provide a period of 180 days before the manufacturer is required to use the DOE test procedure or the alternate test procedure specified in the Decision and Order to make representations of energy efficiency. 10 CFR 430.27(i). When DOE amends the test procedure to address the issues presented in a waiver, the waiver will automatically terminate on the date on which use of that test procedure is required to demonstrate compliance. 10 CFR 430.27(h)(3).

II. Nortek's Petition for Waiver and Interim Waiver

By letter dated September 7, 2021,[4] Nortek filed a petition for waiver and interim waiver from the test procedure for CAC/HPs set forth in appendix M1, when effective.[5] The petition specifies the basic models to be considered under the waiver request. (Nortek, No. 1 at pp. 12-18) In its petition, Nortek asserted that appendix M1 contains errors in the calculations for capacity adjustment and power consumption for the indoor fan at part-load conditions, applicable to testing of two-stage coil-only CAC/HPs. (Nortek, No. 1 at p. 1) As such, Nortek claimed that the DOE test procedure evaluates its specified basic models in a manner unrepresentative of their true energy use; thereby providing materially inaccurate comparative data. *Id.*

Coil-only systems are indoor units that are distributed in commerce without an indoor blower or separate designated air mover. Such systems installed in the field rely on a separately installed furnace or a modular blower for indoor air movement. Because coil-only CAC/HPs do

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[4] A petition submitted under 10 CFR 430.27 is considered "received" on the date it is received by DOE through DOE's established email box for receipt of waiver petitions or, if delivered by mail, on the date the waiver petition is stamped as received by the DOE. 10 CFR 430.27(e)(1)(iii).
[5] As noted, beginning January 1, 2023, any representations, including compliance certifications, made with respect to the energy use, power, or efficiency of CAC/HPs must be based on the results of testing according to the test procedure at appendix M1.

not include their own indoor fan to circulate air, appendix M1 prescribes equations that are used to calculate the assumed (*i.e.*, "default") power input and heat output of an average furnace fan with which the test procedure assumes the indoor coil is pared in a field installation. The resulting fan power input value is added to the electrical power consumption measured during testing. The resulting fan heat output value is subtracted from the measured cooling capacity of the CAC/HP for cooling mode tests and added to the measured heating capacity for heating mode tests. Separate fan power and fan heat equations are provided for different types of coil-only systems (*i.e.*, mobile home or space-constrained vs. "conventional" non-mobile home and non-space-constrained). In each equation, the measured airflow rate (in cubic feet per minute of standard air ("scfm")) is multiplied by a defined coefficient (expressed in Watts ("W") per 1,000 scfm ("W/1000 scfm") for fan power, and British Thermal Units ("Btu") per hour ("Btu/h") per 1000 scfm ("Btu/h/1000 scfm") for fan heat), hereafter referred to as the "default fan power coefficient" and "default fan heat coefficient".

For coil-only units installed in mobile-home and space-constrained systems, appendix M1 defines a default fan power coefficient of 406 W/1000 scfm and a default fan heat coefficient of 1,385 Btu/h/1000 scfm. For coil-only units installed in conventional (*i.e.*, non-mobile-home and non-space-constrained) systems, appendix M1 defines a default fan power coefficient of 441 W/1000 scfm and a default fan heat coefficient of 1,505 Btu/h/1000 scfm[6]. (10 CFR part 430, subpart B, appendix M1, section 3.3.d)   For testing of two-stage coil-only systems, appendix M1 requires testing at two load conditions: (1) full-load, operating at full compressor stage, and (2) low-load (also referred to as part-load), operating at the lower compressor stage. The test procedure defines the relative air volume rates to use for each test. The part-load test has a lower

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[6] For example, for a CAC/HP test conducted at an airflow rate of 1640 scfm, the default fan power for a "conventional" installation would be calculated as (441 W/1000 scfm × 1,640 scfm = 723 W); and the default fan heat would be calculated as (1,505 Btu/h/1000 scfm × 1,640 scfm = 2,466 Btu/h).

air volume rate than the full-load test.[7]   For both the default fan power coefficient and default fan heat coefficient, the same coefficient is used for both the full-load and part-load tests.

Nortek asserted that by applying the same default fan power coefficient and default fan heat coefficient to both the full-load and part-load tests, appendix M1 incorrectly establishes a linear relationship between indoor airflow and fan power (and fan heat); whereas, according to Nortek, a cubic relationship should be applied instead, citing the theoretical fan affinity laws that describe the relationship between fan power and airflow. (Nortek, No. 1 at p. 2) Nortek recommended an alternate test procedure that would define lower default fan power coefficients and default fan heat coefficients for the part-load tests, instead of applying the same coefficients to both the full-load and part-load tests, as is done in appendix M1. (Nortek, No. 1 at pp. 4-9) The lower coefficients recommended by Nortek are based on its analysis that incorporated theoretical fan power (based on fan affinity laws); estimates of fan motor efficiency (based on input from motor experts and Nortek's internal testing and experience); and estimates of the installed base of minimally efficient versus high-efficiency motor technologies (based on estimates from the 2015 energy conservation standards rulemaking). *Id*.

Nortek also requests an interim waiver from the existing DOE test procedure. DOE must review the petition for interim waiver within 45 business days of receipt of the petition. 10 CFR 430.27(e)(1)(ii). If DOE does not notify the applicant of the disposition of the petition for interim waiver, in writing, within 45 business days of receipt of the petition, the interim waiver is granted utilizing the alternate test procedure requested in the petition. *Id.* DOE will grant an interim waiver if it appears likely that the petition for waiver will be granted, and/or if DOE

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[7] Specifically, the indoor air volume rate to be used for testing at part-load (*i.e.*, the "cooling minimum air volume rate") is the higher of (1) the rate specified by the installation instructions included with the unit by the manufacturer, or (2) 75 percent of the cooling full-load air volume rate (see section 3.1.4.2.c of appendix M1).

determines that it would be desirable for public policy reasons to grant immediate relief pending a determination of the petition for waiver. 10 CFR 430.27(e)(2).

III.   Requested Alternate Test Procedure

EPCA requires that manufacturers use DOE test procedures when making representations about the energy consumption and energy consumption costs of covered products. (42 U.S.C. 6293(c)) Consistency is important when making representations about the energy efficiency of covered products, including when demonstrating compliance with applicable DOE energy conservation standards. Pursuant to 10 CFR 430.27, and after consideration of public comments on the petition, DOE may establish in a subsequent Decision and Order an alternate test procedure for the basic models addressed by an Interim Waiver Order.

Nortek seeks to use an alternate test procedure to test and rate the specified ducted, coil-only, two-stage CAC and HP basic models. Nortek's alternate test procedure would require the basic models of CAC/HPs identified in the petition to be tested according to the test procedure at appendix M1, as applicable, except using alternate equations in sections 3.3.d, 3.5.1, 3.7.c, and 3.9.1 for part-load test conditions. As discussed, these sections of appendix M1 are used to calculate adjustments to cooling and heating capacity and adjustments to system power consumption to account for the assumed power input of the indoor fan for coil-only systems. The alternate test procedure requested by Nortek would define lower default fan power coefficients and default fan heat coefficients for the part-load tests, instead of applying the same coefficients to both the full-load and part-load tests, as is done in appendix M1. (Nortek, No. 1 at pp. 4-9)

IV.   Denial of Interim Waiver and Request for Comments

DOE has reviewed Nortek's petition for an interim waiver and the alternate test procedure requested by Nortek. In submitting a petition for waiver, a petitioner must demonstrate that the subject basic model contains one or more design characteristics which either prevent testing of the basic model according to the prescribed test procedures or cause the prescribed test procedures to evaluate the basic model in a manner so unrepresentative of its true energy and/or water consumption characteristics as to provide materially inaccurate comparative data. 10 CFR 430.27(a)(1). In determining whether to grant a request for an interim waiver, DOE considers whether: (1) it appears likely that the petition for waiver will be granted; and/or (2) it would be desirable for public policy reasons to grant immediate relief pending a determination on the petition for waiver. 10 CFR 430.27(e)(2).

Nortek does not claim in its petition for waiver that the subject basic models contain a design characteristic that prevents testing according to DOE test procedure. Instead, Nortek claims that the prescribed test procedures evaluate its coil-only, two-stage systems in a manner so unrepresentative of their true energy characteristics as to provide materially inaccurate comparative data.

In response to this claim, DOE first notes that default fan power coefficients and default fan heat coefficients have been used for both full- and part-load operation for many years prior to DOE having considered the issue explicitly in a 2005 rulemaking. *See* 70 FR 59122, 59128 (October 11, 2005)("October 2005 Final Rule"). The question of whether a lower default fan power coefficient should be used for part-load operation was considered in the October 2005 Final Rule. After consideration of the issue, including consideration of stakeholder comments, DOE implemented a single default coefficient value into the test procedure. *Id*. The use of a

single default fan power coefficient for both full- and part-load capacity was not changed in the most recent test procedure final rule (although the value of the coefficient was updated, with different values specified for mobile home and space constrained versus non-mobile home and non-space-constrained systems). 82 FR 1426, 1452 (January 5, 2017)("January 2017 Final Rule). In the January 2017 Final Rule, DOE adopted the recommendations, including equations to represent the assumed power input of the fan, from a working group formed to negotiate a notice of proposed rulemaking for energy conservation standards for CAC/HPs. 82 FR 1426, 1452. In comments submitted during the course of that rulemaking, manufacturers, including Nortek, expressed support for the use of a single default fan power coefficient to represent both the full- and part-load test conditions for coil-only testing. 82 FR 1426, 1452.

In its petition for waiver, Nortek claims that lower default fan power and fan heat coefficients should be applied to part-load tests. The lower coefficients recommended by Nortek are based on its analysis that incorporated theoretical fan power (based on fan affinity laws); estimates of fan motor efficiency (based on input from motor experts and Nortek's internal testing and experience); and estimates of the installed base of minimally efficient versus high-efficiency motor technologies (based on estimates from the 2015 energy conservation standards rulemaking).

In reviewing Nortek's petition and its proposed alternate test procedure, DOE notes that Nortek's analysis is theoretical, based on the fan laws and estimates of motor efficiencies that Nortek described are based on input from motor experts and its internal testing and experience. Real-world fan motor efficiency can deviate, however, from theoretically predicted values due to a myriad of factors, which do not appear to be reflected in Nortek's analytically-derived estimates. Nortek did not submit any data demonstrating that its fan efficiency estimates are representative of field performance of furnace fans. As such, Nortek has not demonstrated that

the fan efficiency values suggested in the petition would be more representative than the values specified in the current DOE test procedures. In contrast, the analysis conducted by DOE to develop the default indoor fan wattage for coil-only systems for appendix M1 was based on test data and product datasheets indicative of the performance of furnace fans in actual installation. *Id*. at 1451-1452. This data set and analytical approach was the same used to develop fan wattage levels when operating at the reference system external static pressure values for the purposes of determining Fan Energy Rating for furnace fans. (79 FR 499, 506; January 3, 2014). DOE believes that any consideration of an alternative fan wattage factor for part-load operation for coil-only systems should be based on a similarly rigorous analysis that includes real-world test data. Absent such data, DOE is unable to conclude that Nortek's petition for waiver will likely be granted. Further, DOE does not find that public policy reasons weigh in favor of granting immediate relief pending a determination on the petition for waiver. As discussed previously, use of the same default fan power and fan heat coefficients for full-load and part-load tests has been the industry standard for many years and manufacturers expressed their support for this approach in the January 2017 Final Rule. For these reasons, DOE is denying the interim waiver and requesting comment.

DOE makes decisions on waivers and interim waivers for only those basic models specifically set out in the petition, not future models that may be manufactured by the petitioner. Nortek may submit a new or amended petition for waiver and request for grant of interim waiver, as appropriate, for additional basic models of ducted, coil-only, two-stage central air conditioner and heat pumps.

While DOE declines to approve the use of Nortek's suggested alternate test procedure in an interim waiver at this time, DOE may consider including an alternate procedure in a

subsequent Decision and Order. DOE solicits comments from interested parties on all aspects of the petition, including any alternate test procedure.

Signing Authority

This document of the Department of Energy was signed on November 9, 2021, by Kelly Speakes-Backman, Principal Deputy Assistant Secretary and Acting Assistant Secretary for Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the *Federal Register*.

Signed in Washington, DC, on November 9, 2021.

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Treena V. Garrett,
Federal Register Liaison Officer,
U.S. Department of Energy.

Petition for Waiver and Interim Waiver

Date: September 7, 2021
U.S. Department of Energy
Building Technologies Program
1000 Independence Avenue, SW., Mailstop EE-5B
Washington, DC 20585-0121

Via email to: AS_Waiver_Requests@ee.doe.gov

Re: Petitions for Waiver and Interim Waiver on M1 Test Procedure for 2-Stage Central Air Conditioners and Air Source Heat Pumps

Dear Sir/Ms.:

Nortek Global HVAC, LLC (Nortek) respectfully submits petitions for waiver and interim waiver to the Department of Energy (DOE) from certain provisions in the federal test procedure for central air conditioners and heat pumps in Appendix M1 to Subpart B of 10 CFR Part 430 (Appendix M1). Specifically, Nortek is requesting waivers for ducted, coil only, 2 stage, central air conditioners, and air source heat pumps.

Nortek Global HVAC, LLC (Nortek) has been a world-class manufacturer of heating and cooling equipment for 100 years. We pride ourselves in upholding our mission of *creating a better tomorrow, every day.* As a company, we can achieve these standards through a unique combination of innovation, product performance, and responsive support. Nortek Global HVAC and its subsidiaries build and sell HVAC systems under the Maytag, Broan, Frigidaire, NuTone, and Reznor brands, among others.

I. Introduction

The federal test procedure in Appendix M1 indicates tests for coil only, 2-stage, central air conditioners, and air source heat pumps. However, there are errors in the required calculations for capacity reduction and increasing power usage during low stage operation. These errors cause the prescribed test procedure to evaluate the basic model in a manner unrepresentative of its true energy use; thereby, providing materially inaccurate comparative data[1].

II. List of Basic Models

Per 10 CFR §430.27(b)(i), Nortek is providing, in appendix I of this petition, a list of basic models for which Nortek is seeking a waiver and interim waiver from the Appendix M1 test procedure.

III. List of Manufacturers

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[1] see 10 CFR §430.27 (a)(1)

Per 10 CFR §430.27(b)(ii), Nortek is providing, in appendix II of this petition, a list of other manufacturers known to Nortek that distribute into commerce basic models similar in design characteristics to the basic models that are the subject of this petition.

IV. Grounds for petition of interim waiver and waiver

Appendix M1 Sections 3.3.d, 3.5.1, 3.7.c, and 3.9.1 provide equations for decreasing system capacity and increasing power usage for mobile home, space constrained, non-mobile home, and non-space constrained, ducted, two-stage, coil only systems. However, these equations are in error for low-stage operation. M1 incorrectly establishes a linear relationship between high stage and low stage operation for decreasing $Q_c^k(T)$ and increasing $\dot{E}_c^k(T)$ where a cubic relationship should be applied. Fan affinity laws are very clear and stipulate for a constant wheel diameter the relationship between power and air flow rate is:

$P_1 / P_2 = (q_1 / q_2)^3$ where:

P_1 = low stage power P_2 = high stage power q_1 = low stage air flow

q_2 = high stage air flow

source: https://www.engineeringtoolbox.com/fan-affinity-laws-d_196.html

These errors amount to a failure in applying basic engineering principles that are fundamental to the design of HVAC systems. Furthermore, under the prescribed test procedure, a penalty of as much as 1 SEER2 point is realized depending on the application. One SEER2 point is substantial and renders the performance data incomparable to other systems (e.g., single stage, variable speed).

Nortek understands that fan affinity laws apply only to the fan shaft power and do not account for the efficiency of the motor driving the fan. To account for motor efficiencies, Nortek has developed the below data based on input from motor experts and decades of internal testing and experience. This data was reviewed by a major motor supplier to the HVAC industry, and the efficiency estimates were confirmed to be reasonable but conservative relative to realized efficiency in the application.

Air Flow %	PSC Eff Estimate	ECM Eff Estimate
100%	62.6%	80.0%
95%	59.8%	79.0%
90%	55.2%	79.0%
85%	53.1%	79.0%
80%	50.0%	78.5%
75%	46.9%	78.0%

The 2015 ASRAC negotiated rule for Energy Conservation Standards for Central Air Conditioners and Heat Pumps estimated the installed base for PSC and ECM motor to be 77% and 23% respectively[2]. Nortek viewed these estimates as conservative in 2015. And, considering the Fan Efficiency Rating (FER) regulation was implemented in July 2019, it's obvious the installed base is now much more concentrated in ECM motors. However, in the interests of maintaining a conservative approach to this wavier and interim waiver request, Nortek is maintaining the 77%/23% estimates for the purposes of developing blended watts/scfm values for a range of airflows. See below table which represents our recommendations for non-mobile home, non-space constrained, ducted, coil-only, central air conditioning and air source heat pump tests.

Air Flow %	Fan Only Watts/SCFM (excludes Motor)	PSC Eff Estimate	PSC+Fan Watts/SCFM	% PSC	ECM Eff Estimate	ECM+Fan Watts/SCFM	%ECM	Blended Watts/SCFM
100%	0.290	62.6%	0.464	77%	80.0%	0.363	23%	0.441
95%	0.266	59.8%	0.445	77%	79.0%	0.337	23%	0.420
90%	0.226	55.2%	0.410	77%	79.0%	0.287	23%	0.382
85%	0.191	53.1%	0.359	77%	79.0%	0.241	23%	0.332
80%	0.159	50.0%	0.318	77%	78.5%	0.203	23%	0.291
75%	0.131	46.9%	0.279	77%	78.0%	0.168	23%	0.254

See below table which represents our recommendations mobile home, space constrained, ducted, coil-only central air conditioning and air source heat pump tests.

Air Flow %	Fan Only Watts/SCFM (excludes Motor)	PSC Eff Estimate	PSC+Fan Watts/SCFM	% PSC	ECM Eff Estimate	ECM+Fan Watts/SCFM	%ECM	Blended Watts/SCFM
100%	0.267	62.6%	0.427	77%	80.0%	0.334	23%	0.406
95%	0.229	59.8%	0.383	77%	79.0%	0.290	23%	0.362
90%	0.195	55.2%	0.353	77%	79.0%	0.247	23%	0.329
85%	0.164	53.1%	0.309	77%	79.0%	0.208	23%	0.286
80%	0.137	50.0%	0.274	77%	78.5%	0.174	23%	0.251
75%	0.113	46.9%	0.240	77%	78.0%	0.145	23%	0.218

V. Proposed Alternative Test Procedure

As required by 10 CFR §430.27(b)(iii), Nortek is providing the proposed revisions below to Appendix M1 as the alternative to evaluate the performance of the basic models listed in Appendix I of this petition. In addition, a redline markup with these revisions of Appendix M1 is included as Appendix III.

Section 3.3.d for mobile home and space constrained ducted coil-only systems

For low stage operation, revise equation $\dfrac{1385\ Btu/h}{1000\ scfm} * \bar{V}_s$ to:

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[2] **https://www.regulations.gov/document/EERE-2014-BT-STD-0048-0044** CAC_Default Fan Power DRAFT Analysis Summary_2015-09-16_public

3.412 BTU/h * P * V $_s$

And, for low stage operation, revise equation $\dfrac{406\ W}{1000\ scfm} * \bar{\dot{V}}_s$ to:

P * V $_{s.}$

Where P is the power consumption rate corresponding to the minimum airflow rate per the table below. Calculate W/scfm utilizing linear interpolation for minimum airflow values in between the values indicated.

Air Flow %	Blended Watts/SCFM
100%	0.406
95%	0.362
90%	0.329
85%	0.286
80%	0.251
75%	0.218

Section 3.3.d For non-mobile home, non-space constrained home ducted coil-only systems

For low stage operation, revise equation $\dfrac{1505\ Btu/h}{1000\ scfm} * \bar{\dot{V}}_s$ to:

3.412 BTU/h * P * V $_{s.}$

And, for low stage operation, revise equation $\dfrac{441\ W}{1000\ scfm} * \bar{\dot{V}}_s$ to:

P * V $_s$

Where P is the power consumption rate corresponding to the minimum airflow rate per the table below. Calculate W/scfm utilizing linear interpolation for minimum airflow the values in between values indicated.

Air Flow %	Blended Watts/SCFM
100%	0.441
95%	0.420
90%	0.382
85%	0.332
80%	0.291
75%	0.254

Section 3.5.1 For mobile home and space constrained ducted coil-only systems

For low stage operation, revise equation $\frac{1385 \; Btu/h}{1000 \; scfm} * \overline{\dot{V}_s} * \left[T_2 - T_1\right]$ to:

3.412 BTU/h * P * V $_s$ *[τ2 -τ1]

And, for low stage operation, revise equation $\frac{406W}{1000scfm} * \overline{\dot{V}_s} * \left[T_2 - T_1\right]$ to:

P * ∇_s *[τ2 -τ1]

Where P is the power consumption rate corresponding to the minimum airflow rate per the table below. Calculate W/scfm utilizing linear interpolation for minimum airflow values in between the values indicated.

Air Flow %	Blended Watts/SCFM
100%	0.406
95%	0.362
90%	0.329
85%	0.286
80%	0.251
75%	0.218

Section 3.5.1 For non-mobile home, non-space constrained home ducted coil-only systems

For low stage operation, revise equation $\frac{1505 \; Btu/h}{1000 \; scfm} * \overline{\dot{V}_s} * \left[T_2 - T_1\right]$ to:

3.412 BTU/h * P * V $_s$ *[τ2 -τ1]

And, for low stage operation, revise equation $\frac{441W}{1000scfm} * \overline{\dot{V}_s} * \left[T_2 - T_1\right]$ to:

P * ∇_s *[τ2 -τ1]

Where P is the power consumption rate corresponding to the minimum airflow rate per the table below. Calculate W/scfm utilizing linear interpolation for minimum airflow values in between the values indicated.

Air Flow %	Blended Watts/SCFM
100%	0.441
95%	0.420
90%	0.382

85%	0.332
80%	0.291
75%	0.254

Section 3.7.c For mobile home and space constrained coil-only heat pump systems

For low stage operation, revise equation $\dfrac{1385\ Btu/h}{1000\ scfm} * \overline{V}_s$ to:

3.412 BTU/h * P * V $_s$

And, for low stage operation, revise equation $\dfrac{406\ W}{1000\ scfm} * \overline{V}_s$ to:

P * ∇ $_s$.

Where P is the power consumption rate corresponding to the minimum airflow rate per the table below. Calculate W/scfm utilizing linear interpolation for minimum airflow values in between the values indicated.

Air Flow %	Blended Watts/SCFM
100%	0.406
95%	0.362
90%	0.329
85%	0.286
80%	0.251
75%	0.218

Section 3.7.c For non-mobile home, non-space constrained coil-only heat pump systems

For low stage operation, revise equation $\dfrac{1505\ Btu/h}{1000\ scfm} * \overline{V}_s$ to:

3.412 BTU/h * P * V $_s$

And, for low stage operation, revise equation $\dfrac{441\ W}{1000\ scfm} * \overline{V}_s$ to:

P * ∇ $_s$

Where P is the power consumption rate corresponding to the minimum airflow rate per the table below. Calculate W/scfm utilizing linear interpolation for minimum airflow values in between the values indicated.

Air Flow %	Blended Watts/SCFM

100%	0.441
95%	0.420
90%	0.382
85%	0.332
80%	0.291
75%	0.254

Section 3.9.1 For mobile home and space constrained coil-only heat pump systems

For low stage operation, revise equation $\dfrac{1385\ Btu/h}{1000\ scfm} * \bar{V}_s$ to:

3.412 BTU/h * P * V $_s$

And, for low stage operation, revise equation $\dfrac{406\ W}{1000\ scfm} * \bar{V}_s$ to:

P * ∇ $_s$.

Where P is the power consumption rate corresponding to the minimum airflow rate per the table below. Calculate W/scfm utilizing linear interpolation for minimum airflow values in between the values indicated.

Air Flow %	Blended Watts/SCFM
100%	0.406
95%	0.362
90%	0.329
85%	0.286
80%	0.251
75%	0.218

Section 3.9.1 For non-mobile home, non-space constrained coil-only heat pump systems

For low stage operation, revise equation $\dfrac{1505\ Btu/h}{1000\ scfm} * \bar{V}_s$ to:

3.412 BTU/h * P * V $_s$

And, for low stage operation, revise equation $\dfrac{441\ W}{1000\ scfm} * \bar{V}_s$ to:

P * ∇ $_s$

Where P is the power consumption rate corresponding to the minimum airflow rate per the table below. Calculate W/scfm utilizing linear interpolation for minimum airflow values in between the values indicated.

Air Flow %	Blended Watts/SCFM
100%	0.441
95%	0.420
90%	0.382
85%	0.332
80%	0.291
75%	0.254

VI. Petitions for Waiver and Interim Waiver

Per 10 CFR Part 430.27(b)(2), Nortek is applying for a waiver and interim waiver of the applicable test procedure requirements for the basic models listed in Appendix I.

Given the fundamental engineering technical errors regarding the equations for capacity reduction and increasing power usage for low stage operation, Nortek contends the petition for waiver is likely to be granted. Without waiver relief, Nortek will be forced to make representations of efficiency (SEER2) that Nortek knows are understated by almost a full SEER2 point resulting in incomparable performance data versus other systems (e.g., single stage, variable speed). Nortek respectfully requests immediate relief (interim waiver) pending a determination of the petition for waiver.

In addition, Nortek will suffer financial harm if DOE does not grant its waiver and interim waiver request. Without an interim waiver, Nortek will be forced into overdesigning its twostage central air conditioning systems and air source heat pumps by as much as a full SEER2 point depending on application. Furthermore, Nortek estimates this overdesign to add an incremental cost of approximately **[Redacted]** per unit. To the consumer, a **[Redacted]** incremental manufacturing cost adder amounts to approximately **[Redacted]** given the multiple steps in the distribution channel. Nortek urges DOE to consider the public relations difficulties of unnecessarily adding incremental cost and misrepresenting the efficiency of these air conditioners to the public.

VII. Closing

Industry and AHRI are aware of the technical error described in this waiver request. And, AHRI has formed a working group to amend 2023 AHRI Standard 210/240 (Performance Rating for Unitary Air-Conditioning and Air-Source Heat Pump Equipment). However, although the proposed amendments are fundamentally aligned with Nortek's waiver and interim waiver request, Nortek does not believe the 210/240 amendment process and likely subsequent DOE test procedure amendments can completed in sufficient time to provide Nortek with opportunity to develop these systems in time to meet the January 1, 2023, implementation compliance date for central air conditioning and air source heat pump systems. Nortek is currently developing these systems and requires certainty regarding this waiver and interim waiver to ensure implementation in our product designs in time for the January 1, 2023, compliance date for central air-conditioning and air-source heat pumps.

Nortek respectfully requests DOE grant its petitions for waiver and interim waiver of the M1 test procedure for the models listed in Appendix I. We further request an expedited determination of these waivers so that Nortek can promptly continue development of these systems to meet the January 1, 2023, SEER2 energy conservation standard implementation date. If further information is needed to assist DOE in its determination of these waivers, please contact Matt Lattanzi at matt.lattanzi@nortek.com (314-604-3996).

The unredacted version of this waiver and interim waiver request contains confidential commercial information within the meaning of 5 USC § 552(b)(4) and are protected from disclosure under 18 U.S.C. § 1905. Pursuant to 10 CFR § 429.7, Nortek requests that this submission be treated as confidential and not disclosed pursuant to any FOIA request, and declares that: (1) such information is customarily treated as confidential within the industry because its public release would cause competitive injury; (2) such information is not generally known by or available from other sources; (3) such information has not previously been made available to others without obligation concerning the information's confidentiality; (4) public disclosure of the information would result in competitive injury to Nortek by allowing competitors to learn information about Nortek's sales volume; (5) such information will not lose its confidential nature due to the passage of time; and (6) disclosure of such information would be contrary to the public interest because it would undermine free and open competition for the sales of covered products, which benefits consumers.

Sincerely,

/s/

Matthew H. Lattanzi

Senior Director of Regulatory and Legislative Affairs
Nortek Global HVAC, LLC
matt.lattanzi@nortek.com

cc:

APPENDIX I

The interim waiver and waiver requests apply to the following basic models:

Basic model No.	Brand	Outdoor unit	Indoor unit
SA3BE4M1SN60K	MAYTAG	CSA3BE4M1SN60K	C74B(A,H)M060(C,U)-C+TXV
SA3BE4M1SN60K	MAYTAG	CSA3BE4M1SN60K	C74B(A,H)M060(C,U)-D+TXV
SA3BE4M1SN60K	MAYTAG	CSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-C
SA3BE4M1SN60K	MAYTAG	CSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-D
SA3BE4M1SN60K	AC PRO	FSA3BE4M1SN60K	C74B(A,H)M060(C,U)-C+TXV
SA3BE4M1SN60K	AC PRO	FSA3BE4M1SN60K	C74B(A,H)M060(C,U)-D+TXV
SA3BE4M1SN60K	AC PRO	FSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-C
SA3BE4M1SN60K	AC PRO	FSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-D
SA3BE4M1SN60K	BROAN	FSA3BE4M1SN60K	C74B(A,H)M060(C,U)-C+TXV
SA3BE4M1SN60K	BROAN	FSA3BE4M1SN60K	C74B(A,H)M060(C,U)-D+TXV
SA3BE4M1SN60K	BROAN	FSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-C
SA3BE4M1SN60K	BROAN	FSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-D
SA3BE4M1SN60K	FRIGIDAIRE	FSA3BE4M1SN60K	C74B(A,H)M060(C,U)-C+TXV
SA3BE4M1SN60K	FRIGIDAIRE	FSA3BE4M1SN60K	C74B(A,H)M060(C,U)-D+TXV
SA3BE4M1SN60K	FRIGIDAIRE	FSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-C
SA3BE4M1SN60K	FRIGIDAIRE	FSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-D
SA3BE4M1SN60K	NUTONE	FSA3BE4M1SN60K	C74B(A,H)M060(C,U)-C+TXV
SA3BE4M1SN60K	NUTONE	FSA3BE4M1SN60K	C74B(A,H)M060(C,U)-D+TXV
SA3BE4M1SN60K	NUTONE	FSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-C
SA3BE4M1SN60K	NUTONE	FSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-D
SA3BE4M1SN60K	ONYX	FSA3BE4M1SN60K	C74B(A,H)M060(C,U)-C+TXV
SA3BE4M1SN60K	ONYX	FSA3BE4M1SN60K	C74B(A,H)M060(C,U)-D+TXV
SA3BE4M1SN60K	ONYX	FSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-C
SA3BE4M1SN60K	ONYX	FSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-D
SA3BE4M1SN60K	MAYTAG	PSA3BE4M1SN60K	C74B(A,H)M060(C,U)-C+TXV
SA3BE4M1SN60K	MAYTAG	PSA3BE4M1SN60K	C74B(A,H)M060(C,U)-D+TXV
SA3BE4M1SN60K	MAYTAG	PSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-C
SA3BE4M1SN60K	MAYTAG	PSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-D
SA3BE4M1SN60K	NORTEK GLOBAL HVAC LLC	SA3BE4M1SN60K	C74B(A,H)M060(C,U)-C+TXV
SA3BE4M1SN60K	NORTEK GLOBAL HVAC LLC	SA3BE4M1SN60K	C74B(A,H)M060(C,U)-D+TXV
SA3BE4M1SN60K	NORTEK GLOBAL HVAC LLC	SA3BE4M1SN60K	C74B(A,H)MX60(C,U)-C
SA3BE4M1SN60K	NORTEK GLOBAL HVAC LLC	SA3BE4M1SN60K	C74B(A,H)MX60(C,U)-D
SA3BE4M1SN60K	AIRTEMP	VSA3BE4M1SN60K	C74B(A,H)M060(C,U)-C+TXV
SA3BE4M1SN60K	AIRTEMP	VSA3BE4M1SN60K	C74B(A,H)M060(C,U)-D+TXV
SA3BE4M1SN60K	AIRTEMP	VSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-C
SA3BE4M1SN60K	AIRTEMP	VSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-D
SA3BE4M1SN60K	ALL PRO	VSA3BE4M1SN60K	C74B(A,H)M060(C,U)-C+TXV
SA3BE4M1SN60K	ALL PRO	VSA3BE4M1SN60K	C74B(A,H)M060(C,U)-D+TXV
SA3BE4M1SN60K	ALL PRO	VSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-C
SA3BE4M1SN60K	ALL PRO	VSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-D

SA3BE4M1SN60K	AireForce	WSA3BE4M1SN60K	C74B(A,H)M060(C,U)-C+TXV
SA3BE4M1SN60K	AireForce	WSA3BE4M1SN60K	C74B(A,H)M060(C,U)-D+TXV
SA3BE4M1SN60K	AireForce	WSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-C
SA3BE4M1SN60K	AireForce	WSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-D
SA3BE4M1SN60K	FRIGIDAIRE	WSA3BE4M1SN60K	C74B(A,H)M060(C,U)-C+TXV
SA3BE4M1SN60K	FRIGIDAIRE	WSA3BE4M1SN60K	C74B(A,H)M060(C,U)-D+TXV
SA3BE4M1SN60K	FRIGIDAIRE	WSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-C
SA3BE4M1SN60K	FRIGIDAIRE	WSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-D
SA3BE4M1SN60K	GIBSON	WSA3BE4M1SN60K	C74B(A,H)M060(C,U)-C+TXV
SA3BE4M1SN60K	GIBSON	WSA3BE4M1SN60K	C74B(A,H)M060(C,U)-D+TXV
SA3BE4M1SN60K	GIBSON	WSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-C
SA3BE4M1SN60K	GIBSON	WSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-D
SA3BE4M1SN60K	MAMMOTH	WSA3BE4M1SN60K	C74B(A,H)M060(C,U)-C+TXV
SA3BE4M1SN60K	MAMMOTH	WSA3BE4M1SN60K	C74B(A,H)M060(C,U)-D+TXV
SA3BE4M1SN60K	MAMMOTH	WSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-C
SA3BE4M1SN60K	MAMMOTH	WSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-D
SA3BE4M1SN60K	NUTONE	WSA3BE4M1SN60K	C74B(A,H)M060(C,U)-C+TXV
SA3BE4M1SN60K	NUTONE	WSA3BE4M1SN60K	C74B(A,H)M060(C,U)-D+TXV
SA3BE4M1SN60K	NUTONE	WSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-C
SA3BE4M1SN60K	NUTONE	WSA3BE4M1SN60K	C74B(A,H)MX60(C,U)-D
SA3BF4M2SN24K	MAYTAG	CSA3BF4M2SN24K	C74B(A,H)MX24(C,U)-A
SA3BF4M2SN24K	MAYTAG	CSA3BF4M2SN24K	C74B(A,H)MX24(C,U)-B
SA3BF4M2SN24K	AC PRO	FSA3BF4M2SN24K	C74B(A,H)MX24(C,U)-A
SA3BF4M2SN24K	AC PRO	FSA3BF4M2SN24K	C74B(A,H)MX24(C,U)-B
SA3BF4M2SN24K	AIREFORCE	FSA3BF4M2SN24K	C74B(A,H)MX24(C,U)-A
SA3BF4M2SN24K	AIREFORCE	FSA3BF4M2SN24K	C74B(A,H)MX24(C,U)-B
SA3BF4M2SN24K	BROAN	FSA3BF4M2SN24K	C74B(A,H)MX24(C,U)-A
SA3BF4M2SN24K	BROAN	FSA3BF4M2SN24K	C74B(A,H)MX24(C,U)-B
SA3BF4M2SN24K	FRIGIDAIRE	FSA3BF4M2SN24K	C74B(A,H)MX24(C,U)-A
SA3BF4M2SN24K	FRIGIDAIRE	FSA3BF4M2SN24K	C74B(A,H)MX24(C,U)-B
SA3BF4M2SN24K	NUTONE	FSA3BF4M2SN24K	C74B(A,H)MX24(C,U)-A
SA3BF4M2SN24K	NUTONE	FSA3BF4M2SN24K	C74B(A,H)MX24(C,U)-B
SA3BF4M2SN24K	ONYX	FSA3BF4M2SN24K	C74B(A,H)MX24(C,U)-A
SA3BF4M2SN24K	ONYX	FSA3BF4M2SN24K	C74B(A,H)MX24(C,U)-B
SA3BF4M2SN24K	MAYTAG	PSA3BF4M2SN24K	C74B(A,H)MX24(C,U)-A
SA3BF4M2SN24K	MAYTAG	PSA3BF4M2SN24K	C74B(A,H)MX24(C,U)-B
SA3BF4M2SN24K	NORTEK GLOBAL HVAC LLC	SA3BF4M2SN24K	C74B(A,H)MX24(C,U)-A
SA3BF4M2SN24K	NORTEK GLOBAL HVAC LLC	SA3BF4M2SN24K	C74B(A,H)MX24(C,U)-B
SA3BF4M2SN36K	MAYTAG	CSA3BF4M2SN36K	C74B(A,H)MX36(C,U)-B
SA3BF4M2SN36K	MAYTAG	CSA3BF4M2SN36K	C74B(A,H)MX36(C,U)-C
SA3BF4M2SN36K	AC PRO	FSA3BF4M2SN36K	C74B(A,H)MX36(C,U)-B
SA3BF4M2SN36K	AC PRO	FSA3BF4M2SN36K	C74B(A,H)MX36(C,U)-C
SA3BF4M2SN36K	AIREFORCE	FSA3BF4M2SN36K	C74B(A,H)MX36(C,U)-B
SA3BF4M2SN36K	AIREFORCE	FSA3BF4M2SN36K	C74B(A,H)MX36(C,U)-C
SA3BF4M2SN36K	BROAN	FSA3BF4M2SN36K	C74B(A,H)MX36(C,U)-B
SA3BF4M2SN36K	BROAN	FSA3BF4M2SN36K	C74B(A,H)MX36(C,U)-C

SA3BF4M2SN36K	FRIGIDAIRE	FSA3BF4M2SN36K	C74B(A,H)MX36(C,U)-B
SA3BF4M2SN36K	FRIGIDAIRE	FSA3BF4M2SN36K	C74B(A,H)MX36(C,U)-C
SA3BF4M2SN36K	NUTONE	FSA3BF4M2SN36K	C74B(A,H)MX36(C,U)-B
SA3BF4M2SN36K	NUTONE	FSA3BF4M2SN36K	C74B(A,H)MX36(C,U)-C
SA3BF4M2SN36K	ONYX	FSA3BF4M2SN36K	C74B(A,H)MX36(C,U)-B
SA3BF4M2SN36K	ONYX	FSA3BF4M2SN36K	C74B(A,H)MX36(C,U)-C
SA3BF4M2SN36K	MAYTAG	PSA3BF4M2SN36K	C74B(A,H)MX36(C,U)-B
SA3BF4M2SN36K	MAYTAG	PSA3BF4M2SN36K	C74B(A,H)MX36(C,U)-C
SA3BF4M2SN36K	NORTEK GLOBAL HVAC LLC	SA3BF4M2SN36K	C74B(A,H)MX36(C,U)-B
SA3BF4M2SN36K	NORTEK GLOBAL HVAC LLC	SA3BF4M2SN36K	C74B(A,H)MX36(C,U)-C
SA3BF4M2SN48K	MAYTAG	CSA3BF4M2SN48K	C74B(A,H)MX48(C,U)-C
SA3BF4M2SN48K	MAYTAG	CSA3BF4M2SN48K	C74B(A,H)MX48(C,U)-D
SA3BF4M2SN48K	AC PRO	FSA3BF4M2SN48K	C74B(A,H)MX48(C,U)-C
SA3BF4M2SN48K	AC PRO	FSA3BF4M2SN48K	C74B(A,H)MX48(C,U)-D
SA3BF4M2SN48K	AIREFORCE	FSA3BF4M2SN48K	C74B(A,H)MX48(C,U)-C
SA3BF4M2SN48K	AIREFORCE	FSA3BF4M2SN48K	C74B(A,H)MX48(C,U)-D
SA3BF4M2SN48K	BROAN	FSA3BF4M2SN48K	C74B(A,H)MX48(C,U)-C
SA3BF4M2SN48K	BROAN	FSA3BF4M2SN48K	C74B(A,H)MX48(C,U)-D
SA3BF4M2SN48K	FRIGIDAIRE	FSA3BF4M2SN48K	C74B(A,H)MX48(C,U)-C
SA3BF4M2SN48K	FRIGIDAIRE	FSA3BF4M2SN48K	C74B(A,H)MX48(C,U)-D
SA3BF4M2SN48K	NUTONE	FSA3BF4M2SN48K	C74B(A,H)MX48(C,U)-C
SA3BF4M2SN48K	NUTONE	FSA3BF4M2SN48K	C74B(A,H)MX48(C,U)-D
SA3BF4M2SN48K	ONYX	FSA3BF4M2SN48K	C74B(A,H)MX48(C,U)-C
SA3BF4M2SN48K	ONYX	FSA3BF4M2SN48K	C74B(A,H)MX48(C,U)-D
SA3BF4M2SN48K	MAYTAG	PSA3BF4M2SN48K	C74B(A,H)MX48(C,U)-C
SA3BF4M2SN48K	MAYTAG	PSA3BF4M2SN48K	C74B(A,H)MX48(C,U)-D
SA3BF4M2SN48K	NORTEK GLOBAL HVAC LLC	SA3BF4M2SN48K	C74B(A,H)MX48(C,U)-C
SA3BF4M2SN48K	NORTEK GLOBAL HVAC LLC	SA3BF4M2SN48K	C74B(A,H)MX48(C,U)-D
SA3BF4M2SN60K	MAYTAG	CSA3BF4M2SN60K	C74B(A,H)MX60(C,U)-C
SA3BF4M2SN60K	MAYTAG	CSA3BF4M2SN60K	C74B(A,H)MX60(C,U)-D
SA3BF4M2SN60K	AC PRO	FSA3BF4M2SN60K	C74B(A,H)MX60(C,U)-C
SA3BF4M2SN60K	AC PRO	FSA3BF4M2SN60K	C74B(A,H)MX60(C,U)-D
SA3BF4M2SN60K	AIREFORCE	FSA3BF4M2SN60K	C74B(A,H)MX60(C,U)-C
SA3BF4M2SN60K	AIREFORCE	FSA3BF4M2SN60K	C74B(A,H)MX60(C,U)-D
SA3BF4M2SN60K	BROAN	FSA3BF4M2SN60K	C74B(A,H)MX60(C,U)-C
SA3BF4M2SN60K	BROAN	FSA3BF4M2SN60K	C74B(A,H)MX60(C,U)-D
SA3BF4M2SN60K	FRIGIDAIRE	FSA3BF4M2SN60K	C74B(A,H)MX60(C,U)-C
SA3BF4M2SN60K	FRIGIDAIRE	FSA3BF4M2SN60K	C74B(A,H)MX60(C,U)-D
SA3BF4M2SN60K	NUTONE	FSA3BF4M2SN60K	C74B(A,H)MX60(C,U)-C
SA3BF4M2SN60K	NUTONE	FSA3BF4M2SN60K	C74B(A,H)MX60(C,U)-D
SA3BF4M2SN60K	ONYX	FSA3BF4M2SN60K	C74B(A,H)MX60(C,U)-C
SA3BF4M2SN60K	ONYX	FSA3BF4M2SN60K	C74B(A,H)MX60(C,U)-D
SA3BF4M2SN60K	MAYTAG	PSA3BF4M2SN60K	C74B(A,H)MX60(C,U)-C
SA3BF4M2SN60K	MAYTAG	PSA3BF4M2SN60K	C74B(A,H)MX60(C,U)-D
SA3BF4M2SN60K	NORTEK GLOBAL HVAC LLC	SA3BF4M2SN60K	C74B(A,H)MX60(C,U)-C
SA3BF4M2SN60K	NORTEK GLOBAL HVAC LLC	SA3BF4M2SN60K	C74B(A,H)MX60(C,U)-D

SH3BF4M2SX24K	AC PRO	FSH3BF4M2SX24K	C74B(A,H)MX24(C,U)-A
SH3BF4M2SX24K	AC PRO	FSH3BF4M2SX24K	C74B(A,H)MX24(C,U)-B
SH3BF4M2SX24K	AIREFORCE	FSH3BF4M2SX24K	C74B(A,H)MX24(C,U)-A
SH3BF4M2SX24K	AIREFORCE	FSH3BF4M2SX24K	C74B(A,H)MX24(C,U)-B
SH3BF4M2SX24K	BROAN	FSH3BF4M2SX24K	C74B(A,H)MX24(C,U)-A
SH3BF4M2SX24K	BROAN	FSH3BF4M2SX24K	C74B(A,H)MX24(C,U)-B
SH3BF4M2SX24K	FRIGIDAIRE	FSH3BF4M2SX24K	C74B(A,H)MX24(C,U)-A
SH3BF4M2SX24K	FRIGIDAIRE	FSH3BF4M2SX24K	C74B(A,H)MX24(C,U)-B
SH3BF4M2SX24K	NUTONE	FSH3BF4M2SX24K	C74B(A,H)MX24(C,U)-A
SH3BF4M2SX24K	NUTONE	FSH3BF4M2SX24K	C74B(A,H)MX24(C,U)-B
SH3BF4M2SX24K	ONYX	FSH3BF4M2SX24K	C74B(A,H)MX24(C,U)-A
SH3BF4M2SX24K	ONYX	FSH3BF4M2SX24K	C74B(A,H)MX24(C,U)-B
SH3BF4M2SX24K	MAYTAG	PSH3BF4M2SX24K	C74B(A,H)MX24(C,U)-A
SH3BF4M2SX24K	MAYTAG	PSH3BF4M2SX24K	C74B(A,H)MX24(C,U)-B
SH3BF4M2SX24K	NORTEK GLOBAL HVAC LLC	SH3BF4M2SX24K	C74B(A,H)MX24(C,U)-A
SH3BF4M2SX24K	NORTEK GLOBAL HVAC LLC	SH3BF4M2SX24K	C74B(A,H)MX24(C,U)-B
SH3BF4M2SX36K	AC PRO	FSH3BF4M2SX36K	C74B(A,H)MX36(C,U)-B
SH3BF4M2SX36K	AC PRO	FSH3BF4M2SX36K	C74B(A,H)MX36(C,U)-C
SH3BF4M2SX36K	AIREFORCE	FSH3BF4M2SX36K	C74B(A,H)MX36(C,U)-B
SH3BF4M2SX36K	AIREFORCE	FSH3BF4M2SX36K	C74B(A,H)MX36(C,U)-C
SH3BF4M2SX36K	BROAN	FSH3BF4M2SX36K	C74B(A,H)MX36(C,U)-B
SH3BF4M2SX36K	BROAN	FSH3BF4M2SX36K	C74B(A,H)MX36(C,U)-C
SH3BF4M2SX36K	FRIGIDAIRE	FSH3BF4M2SX36K	C74B(A,H)MX36(C,U)-B
SH3BF4M2SX36K	FRIGIDAIRE	FSH3BF4M2SX36K	C74B(A,H)MX36(C,U)-C
SH3BF4M2SX36K	NUTONE	FSH3BF4M2SX36K	C74B(A,H)MX36(C,U)-B
SH3BF4M2SX36K	NUTONE	FSH3BF4M2SX36K	C74B(A,H)MX36(C,U)-C
SH3BF4M2SX36K	ONYX	FSH3BF4M2SX36K	C74B(A,H)MX36(C,U)-B
SH3BF4M2SX36K	ONYX	FSH3BF4M2SX36K	C74B(A,H)MX36(C,U)-C
SH3BF4M2SX36K	MAYTAG	PSH3BF4M2SX36K	C74B(A,H)MX36(C,U)-B
SH3BF4M2SX36K	MAYTAG	PSH3BF4M2SX36K	C74B(A,H)MX36(C,U)-C
SH3BF4M2SX36K	NORTEK GLOBAL HVAC LLC	SH3BF4M2SX36K	C74B(A,H)MX36(C,U)-B
SH3BF4M2SX36K	NORTEK GLOBAL HVAC LLC	SH3BF4M2SX36K	C74B(A,H)MX36(C,U)-C
SH3BF4M2SX48K	AC PRO	FSH3BF4M2SX48K	C74B(A,H)MX48(C,U)-C
SH3BF4M2SX48K	AC PRO	FSH3BF4M2SX48K	C74B(A,H)MX48(C,U)-D
SH3BF4M2SX48K	AIREFORCE	FSH3BF4M2SX48K	C74B(A,H)MX48(C,U)-C
SH3BF4M2SX48K	AIREFORCE	FSH3BF4M2SX48K	C74B(A,H)MX48(C,U)-D
SH3BF4M2SX48K	BROAN	FSH3BF4M2SX48K	C74B(A,H)MX48(C,U)-C
SH3BF4M2SX48K	BROAN	FSH3BF4M2SX48K	C74B(A,H)MX48(C,U)-D
SH3BF4M2SX48K	FRIGIDAIRE	FSH3BF4M2SX48K	C74B(A,H)MX48(C,U)-C
SH3BF4M2SX48K	FRIGIDAIRE	FSH3BF4M2SX48K	C74B(A,H)MX48(C,U)-D
SH3BF4M2SX48K	NUTONE	FSH3BF4M2SX48K	C74B(A,H)MX48(C,U)-C
SH3BF4M2SX48K	NUTONE	FSH3BF4M2SX48K	C74B(A,H)MX48(C,U)-D
SH3BF4M2SX48K	ONYX	FSH3BF4M2SX48K	C74B(A,H)MX48(C,U)-C
SH3BF4M2SX48K	ONYX	FSH3BF4M2SX48K	C74B(A,H)MX48(C,U)-D
SH3BF4M2SX48K	MAYTAG	PSH3BF4M2SX48K	C74B(A,H)MX48(C,U)-C
SH3BF4M2SX48K	MAYTAG	PSH3BF4M2SX48K	C74B(A,H)MX48(C,U)-D

SH3BF4M2SX48K	NORTEK GLOBAL HVAC LLC	SH3BF4M2SX48K	C74B(A,H)MX48(C,U)-C
SH3BF4M2SX48K	NORTEK GLOBAL HVAC LLC	SH3BF4M2SX48K	C74B(A,H)MX48(C,U)-D
SH3BF4M2SX60K	AC PRO	FSH3BF4M2SX60K	C74B(A,H)MX60(C,U)-C
SH3BF4M2SX60K	AC PRO	FSH3BF4M2SX60K	C74B(A,H)MX60(C,U)-D
SH3BF4M2SX60K	AIREFORCE	FSH3BF4M2SX60K	C74B(A,H)MX60(C,U)-C
SH3BF4M2SX60K	AIREFORCE	FSH3BF4M2SX60K	C74B(A,H)MX60(C,U)-D
SH3BF4M2SX60K	BROAN	FSH3BF4M2SX60K	C74B(A,H)MX60(C,U)-C
SH3BF4M2SX60K	BROAN	FSH3BF4M2SX60K	C74B(A,H)MX60(C,U)-D
SH3BF4M2SX60K	FRIGIDAIRE	FSH3BF4M2SX60K	C74B(A,H)MX60(C,U)-C
SH3BF4M2SX60K	FRIGIDAIRE	FSH3BF4M2SX60K	C74B(A,H)MX60(C,U)-D
SH3BF4M2SX60K	NUTONE	FSH3BF4M2SX60K	C74B(A,H)MX60(C,U)-C
SH3BF4M2SX60K	NUTONE	FSH3BF4M2SX60K	C74B(A,H)MX60(C,U)-D
SH3BF4M2SX60K	ONYX	FSH3BF4M2SX60K	C74B(A,H)MX60(C,U)-C
SH3BF4M2SX60K	ONYX	FSH3BF4M2SX60K	C74B(A,H)MX60(C,U)-D
SH3BF4M2SX60K	MAYTAG	PSH3BF4M2SX60K	C74B(A,H)MX60(C,U)-C
SH3BF4M2SX60K	MAYTAG	PSH3BF4M2SX60K	C74B(A,H)MX60(C,U)-D
SH3BF4M2SX60K	NORTEK GLOBAL HVAC LLC	SH3BF4M2SX60K	C74B(A,H)MX60(C,U)-C
SH3BF4M2SX60K	NORTEK GLOBAL HVAC LLC	SH3BF4M2SX60K	C74B(A,H)MX60(C,U)-D

APPENDIX II

The following are manufacturers of other basic models distributed in commerce in the United States and known to Nortek to incorporate design characteristics similar to those found in the basic models that are the subject of the petition for interim waiver and waiver:

- Aaon
- Advanced Distributor Products, LLC
- Allied Air Enterprise, LLC
- Allstyle Coil Company
- Aspen Manufacturing. LLC
- Bosch Thermotechnology Corp
- Carrier Corporation
- ECR International
- Fujitsu General America, Inc.
- GD Midea Heating & Ventilating Equipment Co., LtD.
- Johnson Controls, Inc.
- Lennox International Inc.
- LG Electronics U.S.A., Inc.
- Mitsubishi Electric Cooling and Heating
- Mortex Products, Inc.
- National Comfort Products
- Rheem Manufacturing Company
- Samsung Electronics Co. Ltd.
- Trane Technologies
- Unico, Inc.

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